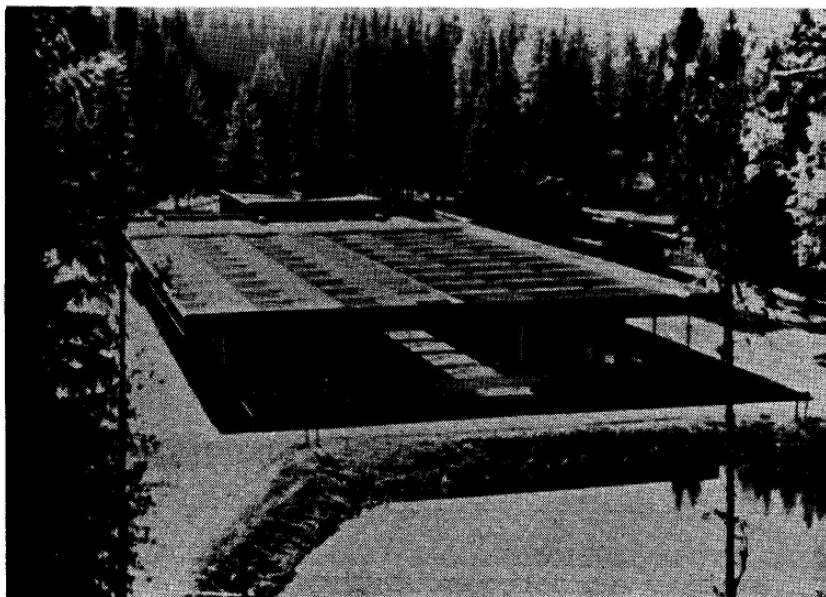


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MCCALL SUMMER CHINOOK SALMON HATCHERY

1990 Brood Year Report



by

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March 1993

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
FISH REARING FACILITIES	2
WATER SUPPLY	3
STAFFING	3
TRAPPING AND SPAWNING	3
FISH PRODUCTION	5
Early Rearing	5
FISH HEALTH	6
FISH MARKING	6
FISH DISTRIBUTION	6
CONCLUSIONS	8
APPENDICES	9

LIST OF TABLES

Table 1. Age breakdown of 1990 summer chinook salmon returns to McCall Fish Hatchery (SFSR) comparing length frequency	4
Table 2. Organosomatic Index for pond #1 and pond 12	7

LIST OF APPENDICES

	<u>Page</u>
Appendix A1. Lengths of brood year 1990 trapped fish	10
Appendix A2. Lengths of brood year 1990 SFSR fish released	11
Appendix A3. Lengths of brood year 1990 SFSR adult salmon ponded	12
Appendix B. Adult returns SFSR brood year 1990 and run timing ..	13
Appendix C. Run timing graph	15
Appendix D. Historic hatchery releases and returns	16
Appendix E. Summer Chinook distribution in the South Fork of the Salmon River	17
Appendix F. Brood year 1990 chinook survival from green eggs to reased smolts	18
Appendix G. Temperature range from August 1990 through March 1992	18
Appendix G1. Temperature range graph	19
Appendix H. Water analysis	20
Appendix I. Brood year 1990 production cost table	20
Appendix J. Brood year 1990 marked fish that were released	21

ABSTRACT

The South Fork of the Salmon River weir and fish trap were put into operation on June 19, 1990, with the conclusion of trapping on September 10, 1990.

Salmon spawning at the trap commenced on August 10 and concluded on September 10, 1990. A total of 969 returning chinook salmon were trapped, measured, and recorded during this time period. The overall average eye-up from eggs taken was 92.3%, with a total overall survival of 81.1% to smolt release.

Of the 969 salmon trapped, 380 were females, 264 were ponded, and 116 were released with a pre-spawn mortality of 7 fish, or 2.6%. There were 561 adult males trapped, 364 were ponded, and 197 were released upstream with a pre-spawn mortality of 11 fish, or 3.0%. There were 28 jacks trapped (according to length frequency criteria); 12 were used for *spawning*, 2 were released upstream during trapping, 3 more were released at conclusion of trapping, and 11 died in the holding pond for a 39% mortality.

From the 264 ponded females, 257 were spawned yielding 1,111, 400 green eggs for an average fecundity of 4,325 eggs per female. There were 1,000 green eggs given to Intermountain Research and 5,000 to the Nez Perce Tribe research biologists.

During the fourth week of March 1992, there were 901,500 brood year 1990 smolts weighing 37,915 pounds transported and released at Knox bridge on the South Fork of the Salmon River near Warm Lake.

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INTRODUCTION

McCall Summer Chinook Hatchery was built in 1979 as a result of the Water Resources Development Act enacted by congress in 1976. A portion of this act is the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). The LSRCP compensates Idaho for fish and wildlife losses caused by the Lower Snake River Projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams). The McCall Summer Chinook Hatchery was the first hatchery built as partial fulfillment of the LSRCP. LSRCP funding is administered to the Idaho Department of Fish and Game (IDFG) by the U.S. Fish and Wildlife Service.

The McCall Hatchery is located within the city limits of McCall, Idaho along the North Fork of the Payette River, approximately 0.16 km (1/4 mile) downstream from Payette Lake.

A satellite facility for trapping and spawning adult chinook salmon is located on the South Fork of the Salmon River near Warm Lake approximately, 26 miles east of Cascade, Idaho.

The main production for McCall Hatchery is summer chinook salmon reared to smolt size. There is also a resident trout program funded solely by IDFG.

The first salmon reared at the McCall Summer Chinook Hatchery were transferred in from the Mackay Fish Hatchery and Dworshak/Kooskia National Fish Hatchery Complex. These eggs were the product of adult summer chinook trapped at Little Goose and Lower Granite dams. The first eggs from the South Fork of the Salmon trap were received in August of 1980.

OBJECTIVES

The mitigation goal is to return 8,000 adult summer chinook salmon above Lower Granite Dam. The objectives of the McCall Summer Chinook Hatchery are:

1. Restore summer chinook salmon Oncorhynchus tshawytscha to the South Fork of the Salmon River; historically a major summer chinook stream in Idaho.
2. Trap and spawn adult salmon returning to the South Fork of the Salmon River.
3. Raise 1,000,000 summer chinook smolts for release into the South Fork of the Salmon River.
4. Evaluate fish rearing capabilities of the McCall Hatchery.
5. Work with management and research to identify optimum operating procedures for the McCall Hatchery.

FISH REARING FACILITIES

The hatchery facility consists of six buildings on approximately 15 acres of ground. The largest building consists of shop, parking garage, incubation and early rearing area, generator room, and feed/freezer room. The office and three bedroom dormitory are contained in one building. There is a visitor center with restrooms, a flow chart for a self-guided tour and historical information signs. There are three residences for permanent personnel also located on the site.

The fish production units include:

1. Twenty-six 8-tray stacks of F.A.L. (Heath type) incubators.
2. Fourteen concrete vats 4 ft x 40 ft x 2 ft (water depth); 320 cubic feet of rearing area per vat.
3. Two concrete rearing ponds 196 ft x 40.5 ft 3 ft (water depth); 23,814 cubic feet of rearing space per pond.
4. One concrete collection basin 101 ft x 15 ft x 4 ft (water depth).

Designed capacity of the hatchery is to raise 1,000,000 smolts averaging 17 fish per pound.

An adult trapping and spawning facility is located on the South Fork of the Salmon River near Warm Lake. This facility is equipped with a removable weir, fish ladder, trap, two adult holding ponds (10 ft x 90 ft), and a covered spawning area. Water is supplied from the South Fork of the Salmon River through a 33-inch underground pipeline. Holding capacity for the facility is approximately 1,000 adults. Adults trapped in excess of the egg needs are passed above the weir for natural spawning. Eggs collected at the facility are transported "green" to McCall for incubation and rearing.

WATER SUPPLY

Hatchery water is obtained by gravity flow from Payette Lake through a 36-inch underground pipeline. Water may be taken from the surface or from a depth of 50 feet, thus providing the capability of obtaining the best water temperature available.

Through an agreement with the Payette Lake Reservoir Company, 20 cubic feet per second (cfs) of water flow is available for hatchery use. Design criteria and production goals were established using this constraint, ensuring that the hatchery has enough water to meet its production goals.

Water quality analysis reveals a somewhat "distilled" system for rearing fish (Appendix H). Total hardness ranges from 6.3 to 7.06 mg CaCO₃/l, while Ph stays about 6.8. There are no problems with heavy metals and the temperature is maintained at 52°F to 56°F, with a low of 37°F.

STAFFING

The hatchery is staffed with three permanent employees: a Hatchery Superintendent III, a Hatchery Superintendent I, and a Fish Culturist. In addition, there are four temporary employees to assist during the busy field season.

TRAPPING AND SPAWNING

The weir and trap on the South Fork of the Salmon River were put into operation on June 19, 1990, and trapping continued through September 10, 1990. The peak of the run was July 16.

There were a total of 969 fish trapped; 40% or 380 were females and 60% or 589 were males. There were 199 males (including 2 jacks) and 116 females released upstream of the weir to spawn naturally.

Fork lengths were taken on all fish trapped (Appendix A). Approximately one-third of the unmarked males and one-third of the unmarked females were tagged with Peterson discs and jaw tags and released upstream of the weir. The tagging and follow-up work was conducted by the University of Idaho personnel to determine the extent of hatchery and wild fish interaction and differences in spawning area. Of the 969 fish trapped, 189 were ad-clipped, which indicated coded wire tags (CWT). All of these fish had snouts and scales removed and sent to the Lewiston Lab for recovery.

The age class determination by length frequency was used at the trap site during initial trapping. The coded wire tag recovery data and scale analysis showed an overlap of age classes originally determined by length frequency. (Table 1)

Table 1. Age breakdown of 1990 summer chinook salmon returns to McCall Fish Hatchery (SFSR) comparing length frequency.

		Method
Brood year/acre	Length/Frequency	CWT*
Total Number Trapped		
87/3	28	11
86/4	911	947
85/5	30	11
Male Numbers		
87/3	28	11
86/4	576	567
85/5	14	11
Female Numbers		
87/3	0	0
86/4	335	380
85/5	16	0
TOTALS	969	969

CWT data based on 189 snouts recovered and expanded for entire run. Length data taken at trapping prior to first sort.

Age class breakdown

66 cm = jacks
 67 cm - 89 cm = 4-year olds
 >90 cm = 5-year-olds
 *Expend numbers

All of the ponded fish were injected at trapping with Erythromycin Phosphate in the dorsal sinus area at a rate of 1 cc per 10 pounds of body weight from a stock solution of 15.4 grams Erythromycin Phosphate per 250 mls distilled water. The males and females were placed in separate ponds and treated with 167 ppm formalin three days per week for fungus control.

Pre-spawn mortality for the adults was low; 11 males or 3.0% and 7 females or 2.6%. The jack pre-spawn mortality rate was higher; 11 fish or 39%, and did not show up until late during the spawning after they had been crowded and sorted several times.

Spawntaking activities started on August 10, 1990 and concluded on September 10, 1990. There were nine spawn days during this period, with 1,111,400 eggs taken from 257 females for an average fecundity of 4,325 eggs per female. There were 245 males and 12 jacks used for fertilization. All eggs taken were water-hardened for one hour in a 100 ppm titrateable iodine solution prior to being transported back to McCall Hatchery.

Fecundity rate is estimated at 4,500 eggs per female until the eye-up stage is reached and the eggs are enumerated. At eye-up, the eggs are shocked by siphon, picked with an electronic egg picker, and enumerated by displacement due to an egg counter malfunction.

Incubator flows are set 5 gallons per minute and are loaded at 2,000 cc, or approximately 8,000 eggs per tray. If space allows, 1,500 to 1,800 cc of eggs per tray is utilized. The eggs are treated with 1,667 ppm of formalin for 15 minutes starting 3 days after fertilization and continues.

Eggs eye-up at approximately 600 thermal units (TU) and are then shocked, picked, and enumerated. Hatching starts at approximately 925 TUs. There were 1,025,395 eggs that survived to the eyed stage from the original 1,111,400 for an average eye-up of 92.3%.

FISH PRODUCTION

Early Rearing

Fry are set out to the concrete vats approximately three days prior to initial feeding. Initial feeding begins between 1,750 and 1,775 Tue. Flows for the vats are set at 80 gallons per minute and are loaded at 70,000 to 100,000 fish per vat, depending on the number of fry on hand. The vats start at half length and are extended to full length when the density index (DI) reaches .40, usually around mid-February.

Beginning growth rates are slow, only .003 to .004 inches per day, due to the cold water temperatures of only 37°F to 39°F. The fry are started on Bio-Diet #2 and #3 feed, and stay on 13 until they reach 700 fish per pound. Bio-Diet feed has been used successfully at McCall Hatchery using modified feed rates. The conversion rates average 1.1 to 1.3 during the fry rearing stage.

Fish are moved outside to the final rearing ponds mid-May at about 250 to 350 fish per pound. The two outside ponds are loaded with 500,000 plus fish each, and reach a DI of .21 at release for 1,000,000 smolts averaging 17 fish per pound. Rearing densities of the brood year 1990 fry were maintained as evenly as possible to evaluate "handled" or marked fish versus "unhandled" or non-marked fish comparing overall mortality, Bacterial Kidney Disease (BKD) incidence, and adult returns. Pond #1 was the non-marked pond and was fed a TM-100 feed treatment for 14 days to give them a florescent mark on the vertebrae, thus distinguishing them from the unmarked returning adults. Pond #2 received CWT with adipose clips and freeze brands, etc. (Appendix J).

The fish are fed two medicated feed treatments of Gallimycin at 4.5 grams of active Erythromycin Phosphate per 100 pounds of fish at 2% body weight during the rearing cycle. The first feeding was just after ponding, and the second was late August.

There were no major disease problems noted for brood year 1990 fish and no significant mortality noted. The temperature ranges from 45°F in May to 55°F in August and down to 37°F in February. This variation in temperature contributes to variable growth rates and daily length increase rates of .003 to .023. Feed rates average 1.5% of body weight.

FISH HEALTH

In 1991, Eagle Fish Health Laboratory suggested a strict interpretation of the existing INAD established for usage of Erythromycin medicated feed. The protocol used was a 14-day application rather than a 21-day. The preliberation sample found an unusually high number of Renibacterium positive fish.

Just prior to sampling, an otter was seen several days in a row depredating the fish in pond #2. This pond showed three times as many positives (BKD+, 10/30) as did pond #1 (BKD+, 3/30).

Organosomatic data showed that the mesenteric fat averaged between 3 and 4. This goal was established by the McCall Hatchery staff earlier in the growing season. The stored energy in the adipose deposits may help the smolt make the transition from a hatchery habitat to the wild. Further data collection is warranted regarding optimum mesenteric fat levels for hatchery smolts.

In general, fish health parameters were maintained at optimum levels for juvenile fish. Areas of main concern should be focused at the South Fork Trap. A well with a source of cool water could be utilized to maintain optimum water temperatures for brood fish in the holding ponds. A modern crowding apparatus could be considered to lessen stress on the brood fish being held at this trap. Possibly in the future, a culling program could be implemented to remove high BKD+ lots.

FISH MARKING

The fish marking crews began work on the fish on October 7 and finished October 15, 1991. There was a total of 437,253 fish marked. There were 325,107 that received CWT and adipose fin clips; 63,746 of these also received freeze brands and 111,397 were RV-clipped. There were 250 fish in each pond that were PIT-tagged. The CWT codes ranged from 10/34/46 through 10/34/60. The freeze brands were RA-7U-1, RA-7U-3, and LD-7U-1. There were 452,500 fish in pond #1 that were marked with a TM-100 oral feed treatment. (Appendix J.)

The fish in the marked or "handled" showed no more stress behavior than the other pond, and there was not significantly higher mortality.

Table 2. Organosomatic Index for pond #1 and pond #2.

Eyes	Gills	Pseudo- branches	Thymus	Mesen. fat	Spleen	Hind gut	Kidney	Liver	Bile
Pond #1									
N 30	N 22	N 30	0 30	0 0	B 0	0 30	N 30	A 0	0 4
B1 0	F 8	S 0	1 0	1 1	R 30	1 0	S 0	B 28	1 26
B2 0	C 0	L 0	2 0	2 2	G 0	2 0	M 0	C 2	2 0
E1 0	M 0	S&L 0		3 14	No 0		G 0	D 0	3 0
E2 0	P 0	I 0		4 13	E 0		U 0	E 0	
H1 0	OT 0	OT 0	x=0.00		OT 0	x=0.00	T 0	F 0	
H2 0		O 0		x=3.30				OT 0	x=0.87
M1 0									
M2 0									
OT 0									
Summary of Normals									
100	64	100	100	0	100	100	100	93	0
Pond #2									
N 30	N 24	N 30	0 30	0 0	B 0	0 30	N 29	A 0	0 7
B1 0	F 6	S 0	1 0	1 12	R 30	1 0	S 0	B 28	1 23
B2 0	C 0	L 0	2 0	2 3	G 0	2 0	M 0	C 2	2 0
E1 0	M 0	S&L 0		3 10	No 0		G 0	D 0	3 0
E2 0	P 0	I 0		4 15	E 0		U 1	E 0	
H1 0	OT 0	OT 0	x=0.00		OT 0	x=0.00	T 0	F 0	
H2 0		O 0		x=3.21				OT 0	x=0.00
M1 0									
M2 0									
OT 0									
Summary of Normals									
100	75	100	100	0	100	100	97	93	0

BYRP90

FISH DISTRIBUTION

The brood year 1990 smolt hauling operation began on March 23, 1992 and concluded on March 27, 1992. A total of 901,500 smolts weighing 37,915 pounds were transported by truck and released at Knox Bridge near Warm Lake on the South Fork of the *Salmon* River. The fish averaged 23.8 fish per pound and were 4.8 inches average fork length (Appendix E).

CONCLUSIONS

The brood year 1990 fish appeared to be excellent fish all of the way through the rearing cycle. There was very good survival to Lower Granite Dam; maybe this is a good size to release. The release was a week later than the past two years, but may have been timed right. The tempering and release pipe are just one more step to try to improve survival and they appear to help at the present.

A P P E N D I C E S

Appendix A1. Lengths of brood year 1990 trapped fish.

Fork length (cm)	Males	Females
43	1	0
45	1	0
46	1	0
50	1	0
53	1	0
56	1	0
61	2	0
62	1	0
63	1	0
64	5	0
65	2	0
66	11	0
67	2	1
68	14	6
69	21	1
70	12	4
71	26	7
72	32	11
73	35	16
74	55	10
75	37	17
76	41	31
77	36	30
78	45	32
79	40	29
80	37	36
81	33	32
82	34	28
83	21	19
84	19	9
85	10	2
86	12	5
87	8	3
88	4	2
89	2	4
90	2	2
91	4	2
92	3	3
93	1	2
94	1	2
95	0	1
96	1	2
97	1	2
103	1	0
Total Trapped	618	351

Appendix A2. Lengths of brood year 1990 SFSR fish released.

Fork length (cm)	Males	Females
63	1	0
64	1	0
65	0	0
66	0	0
67	0	0
68	4	2
69	8	1
70	4	2
71	8	2
72	9	5
73	9	4
74	18	4
75	10	5
76	18	9
77	16	19
78	16	7
79	11	8
80	11	10
81	10	11
82	14	7
83	8	2
84	7	6
85	5	2
86	5	1
87	3	0
88	1	1
89	0	2
90	1	1
91	0	1
92	0	3
93	0	0
94	0	0
95	0	0
96	0	0
97	0	1
98	0	0
99	0	0
100	0	0
101	0	0
102	0	
103	1	0
104	0	0
105	0	0
Total Measured	199	116

The male total included two jacks released according to length frequency.

Appendix A3. Lengths of brood year 1990 SFSR adult salmon ponded.

Fork length (cm)	Males	Females,
67	2	1
68	10	4
69	13	0
70	8	2
71	18	5
72	23	6
73	26	12
74	37	6
75	27	12
76	23	22
77	20	11
78	29	25
79	29	21
80	26	26
81	23	21
82	20	21
83	13	17
84	12	3
85	5	0
86	7	4
87	5	3
88	3	1
89	2	2
90	1	1
91	4	1
92	3	0
93	1	2
94	1	2
95	0	1
96	1	2
97	1	1
98	0	0
99	0	0
100	0	0
101	0	0
102	0	0
103	0	0
104	0	0
105	0	
Total Measured	393	235

These number represent the lengths of adult salmon ponded prior to first sort.
The male total does not include 26 jacks ponded.

Appendix B. Adult returns SFSR brood year 1990 and run timing.

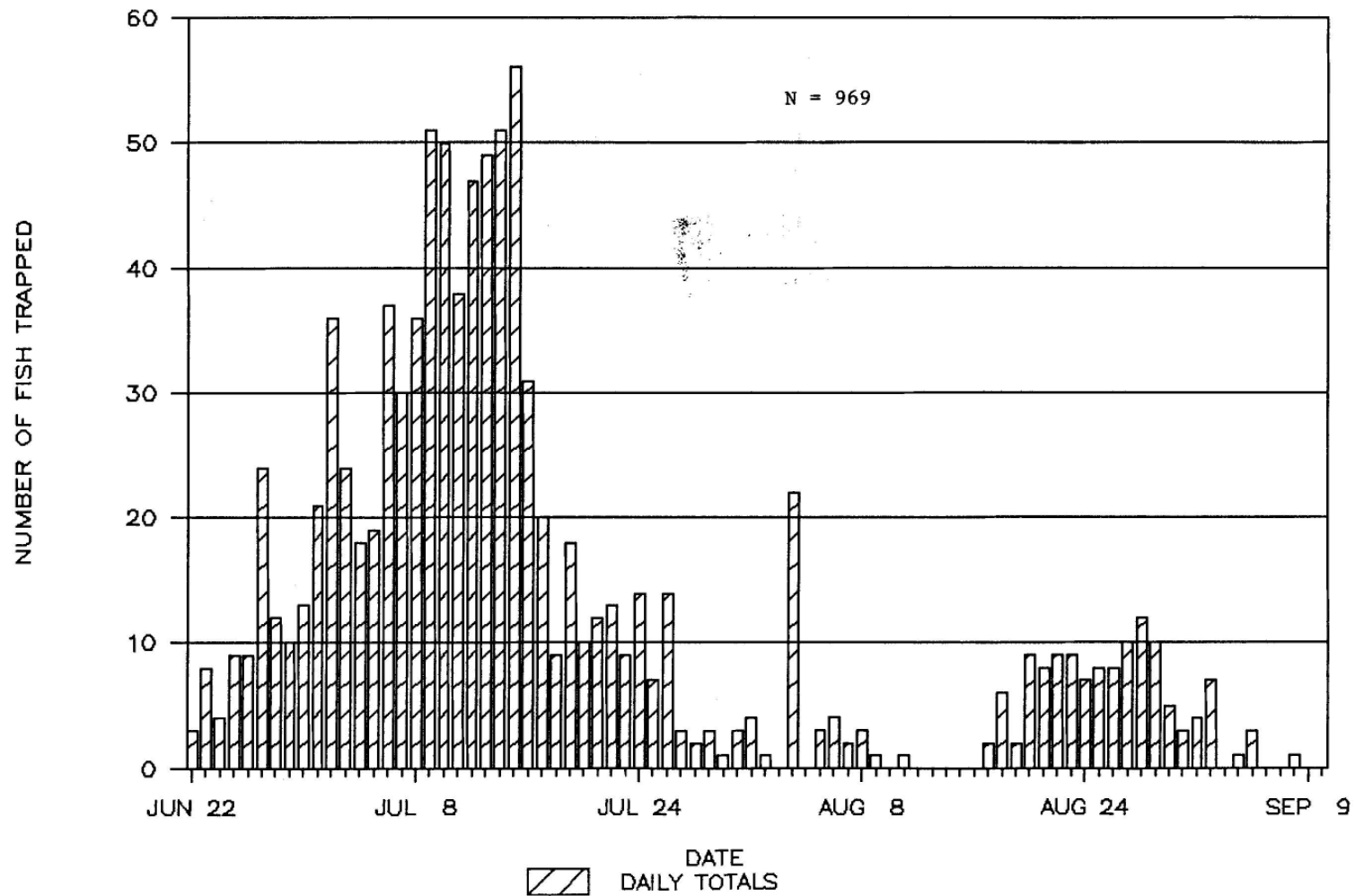
Date	Total run	Males	Females	Jacks
JUN 22	3	1	2	0
JUN 23	8	3	5	0
JUN 24	4	2	2	0
JUN 25	9	4	4	1
JUN 26	9	4	5	0
JUN 27	24	13	9	2
JUN 28	12	9	3	0
JUN 29	10	9	0	1
JUN 30	13	7	4	2
JUL 1	21	14	7	0
JUL 2	36	23	11	2
JUL 3	24	14	10	0
JUL 4	18	8	9	1
JUL 5	19	9	9	1
JUL 6	37	25	12	0
JUL 7	30	18	11	1
JUL 8	36	26	9	1
JUL 9	51	34	16	1
JUL 10	50	27	22	1
JUL 11	38	23	13	2
JUL 12	47	35	11	1
JUL 13	49	39	10	0
JUL 14	51	33	15	3
JUL 15	56	37	19	0
JUL 16	31	13	17	1
JUL 17	20	12	8	0
JUL 18	9	5	3	1
JUL 19	18	10	7	1
JUL 20	10	4	6	0
JUL 21	12	6	6	0
JUL 22	13	6	7	0
JUL 23	9	5	4	0
JUL 24	14	2	12	0
JUL 25	7	4	3	0
JUL 26	14	5	9	0
JUL 27	3	2	1	0
JUL 28	2	0	1	1
JUL 29	3	1	2	0
JUL 30	1	0	1	0
JUL 31	33	1	2	0
AUG 1	4	2	2	0
AUG 2	1	1	0	0
AUG 3	0	0	0	0
AUG 4	22	1	1	0
AUG 5	3	2	1	0
AUG 6	4	0	3	1
AUG 7	2	2	0	0

Appendix B. Continued.

Date	Total run	Males	Females	Jacks
AUG 8	3	2	1	
AUG 9	1	0	0	1
AUG 10	0	0	0	0
AUG 11	1	0	1	0
AUG 12	0	0	0	0
AUG 13	0	0	0	0
AUG 14	0	0	0	0
AUG 15	0	0	0	0
AUG 16	0	0	0	0
AUG 17	2	2	0	0
AUG 18	6	5	1	0
AUG 19	2	2	0	0
AUG 20	9	8	1	0
AUG 21	8	5	3	0
AUG 22	9	9	0	0
AUG 23	9	7	2	0
AUG 24	7	3	4	0
AUG 25	8	1	7	0
AUG 26	8		5	0
AUG 27	10	6	4	0
AUG 28	12	9	2	1
AUG 29	10	7	3	0
AUG 30	5	4	1	0
AUG 31	3	3	0	0
SEP 1	4	4	0	0
SEP 2	7	6	1	0
SEP 3	0	0	0	0
SEP 4	1	1	0	0
SEP 5	3	2	1	0
SEP 6	0	0	0	0
SEP 7	0	0	0	0
SEP 8	1	0	0	1
SEP 9	0	0	0	0
SEP 10	0	0		0
Total	969	590	351	28

The totals shown are from the daily trap sheet, there were 29 females misidentified to bring the totals to 561 males, 380 females, and 28 jacks.

SOUTH FORK SUMMER CHINOOK RUN 1990



Appendix C. Run timing graph.

Appendix D. Historic hatchery releases and returns.

Brood year	Release year	Number fish	3-yr old	Year returned	4-yr old	Year returned	5-yr old	Year returned	Percent returned
1978	1980	124,800	124	1981	462	1982	161	1983	0.598
1979	1981	248,926	48	1982	272	1983	221	1984	0.217
1980	1982	122,247	504	1983	7113	1984	151	1985	1.119
1981	1983	183,896	595	1984	1,259	1985	203	1986	1.119
1982	1984	269,880	828	1985	1,265	1986	202	1987	0.85
1983	1985	564,405	1,222	1986	2,117	1987	893	1988	0.674
1984	1986	970,348	386	1987	1,392	1988	191	1989	0.255
1985	1987	958,300	50	1988	252	1989	30	1990	0.035
1986	1988	1,060,400	495	1989	911	1990	154	1991	0.147
1987	1989	975,000	28	1990	237	1991	0	1992	
1988	1990	1,032,500	821	1991	0	1992	0		
1989	1991	708,600	0	1992	0		0		
1990	1992	901,500	0		0		0		

Appendix E. Summer chinook distribution in the South Fork of the Salmon River.

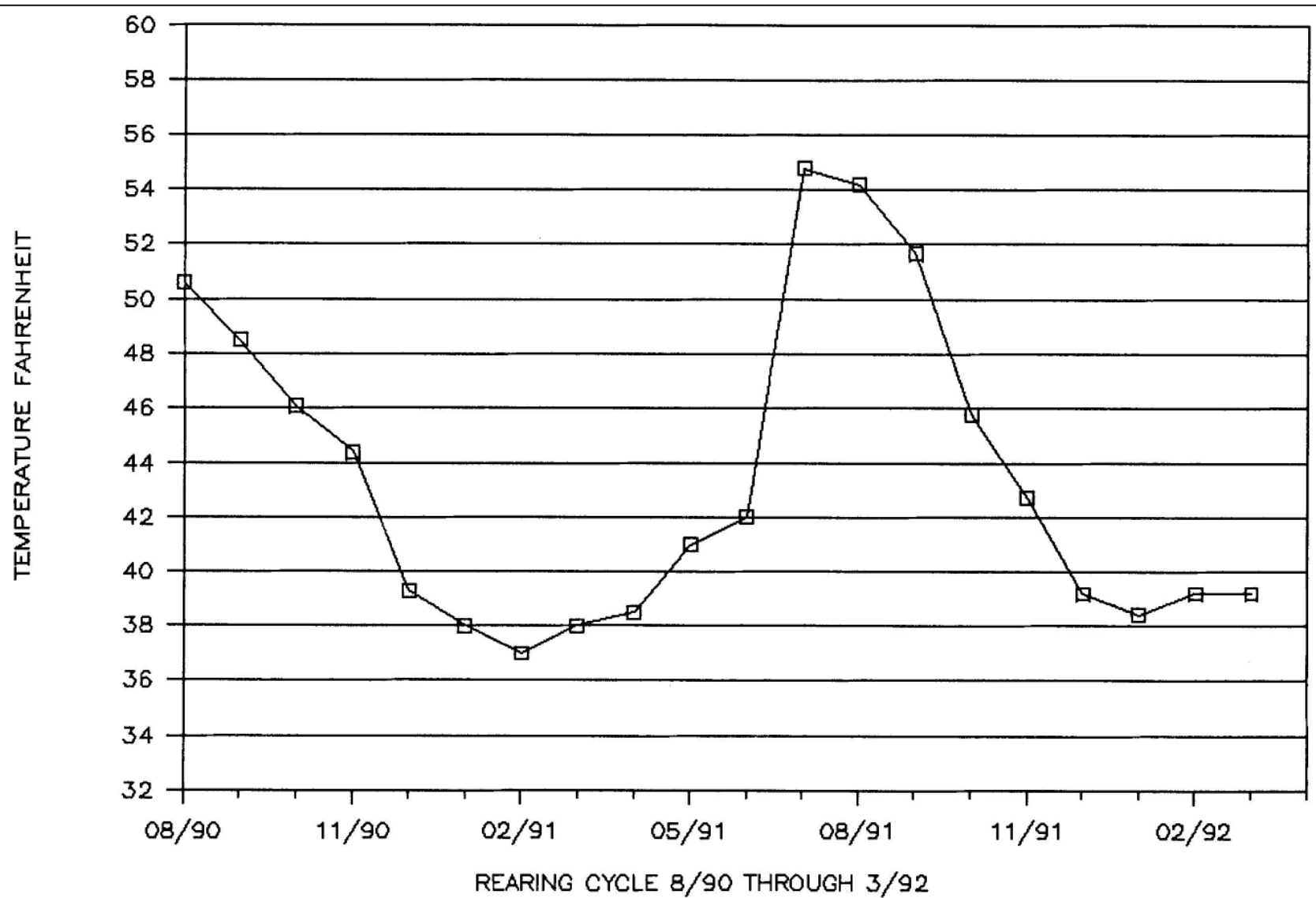
Destination	Weight	#/lb	# released
Knox Bridge	4,350	23.7	103,324
Knox Bridge	4,375	23.8	104,037
Knox Bridge	4,375	23.8	104,037
Knox Bridge	4,200	23.8	99,876
Knox Bridge	4,275	23.8	101,660
Knox Bridge	4,200	23.8	99,876
Knox Bridge	4,315	23.8	102,611
Knox Bridge	4,300	23.8	102,254
Knox Bridge	3,525	23.8	83,825
Total Released	37,915		901,500

Appendix F. Brood year 1990 chinook survival from green eggs to released smolts.

<u>Green egg</u> <u>number</u>	<u>Eyed egg</u> <u>number</u>	<u>Percent</u> <u>survival</u>	<u>Ponded</u>	<u>Percent</u> <u>survival</u>	<u>Released</u> <u>smolts</u>	<u>Percent</u> <u>survival</u>
1,111,400	1,025,395	92.3	920,177	82.7	901,500	81.1

Appendix G. Temperature range from August 1990 through March'1992.

<u>Date</u>	<u>Temperature</u>
08/90	50.6
09/90	48.5
10/90	46.1
11/90	44.4
12/90	39.3
01/91	38
02/91	37
03/91	38
04/91	38.5
05/91	41
06/91	42
07/91	54.8
08/91	54.2
09/91	51.7
10/91	45.8
11/91	42.7
12/91	39.2
01/92	38.4
02/92	39.2
03/92	39.2



Appendix G1. Temperature range graph.

Appendix H. Water analysis.

Date	pH	Ammonia	Nitrate	Nitrite	Total phosphate	Total KJEL nitrogen	CaCO2 hard.	% Sat.	02 ppm
1988	6.8	-	-	-	-	-	<10	97/103	7/10
1991		<0.05	<0.1	<0.1	<0.05	<0.10			

Appendix I. Brood year 1990 production cost table.

Number of fish	Lbs of feed	Cost of feed	Lbs of fish	Conversion	Total cost	Cost/ 1,000	Cost/ lb
901,500	46,772	\$33,600	37,915	1.23	\$273,800	\$303.71	\$7.22

Appendix J. Brood year 1990 marked fish that were released.

Date	Number fish marked	Mark	Pur ^P ose	Number marked fish released	Site/Group release
10-7/10-15-91	325,107	CWT/AD	US-CAN	322,093	901,500
10-7/10-15-91	*63,746	FB/CWT/AD	Water/Budget	63,246	901,500
10-7/10-15-91	500	PIT	Research	500	901,500
10-7/10-15-91	111,646	RV	Research	450,750	901,500
7-15/7-28-92	452,500	TM-100	Research	450,750	901,500
Totals	889,753			884,740	901,500

*These fish are included in the regular CWT/AD fish total.


Submitted by:

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IDAHO DEPARTMENT OF FISH AND GAME


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